Safetygram

NCI-Frederick

ISM-176 LABORATORY PERSONNEL MAY 2002

SAFE HANDLING OF LIQUID NITROGEN

Liquid nitrogen (LN_2) is used throughout the NCI-Frederick for various procedures and is supplied to many users in portable tanks. Recent events associated with the venting of these tanks indicated the need for changes in the equipment used in filling these containers. Improvements to this system have been made; no problems have since been reported.

In addition to these engineering improvements, adherence to safe work practices by users is necessary to reduce the potential for accidents or injury while transporting, storing, transferring, and using LN_2. At a temperature of approximately -196^{o} C, LN_2 will freeze tissue on contact and cause embrittlement of plastics and rubber. Therefore, only containers specifically designed for use with cryogenic liquids, such as dewar flasks, should be used with LN_2.

When transporting LN_2 tanks, certain personal protective equipment (PPE) and safe work practices should be employed by the person moving the tank. This PPE should include eye protection, leather gloves, and safety shoes. Special carts designed for moving these tanks should be used. Tanks should be loaded on these carts so that the pressure relief vent is directed away from the handler. Get assistance if needed to help prevent back injuries or other physical injuries that may be caused by moving the tanks. The pressure relief vent should also be directed away from personnel at the point of use.

Transfer operations involving open containers should be performed slowly to minimize boiling and splashing of the LN_2. PPE used during this activity should include insulated gloves with long cuffs, splash shield with goggles, and a fully fastened lab jacket. As LN_2 evaporates, it expands to a volume nearly 700 times greater than the original volume of the liquid. Therefore, transfer operations should be conducted in well-ventilated areas to prevent the displacement of atmospheric oxygen by nitrogen gas.

Another hazard associated with LN_2 is the potential to concentrate oxygen in or near a cryogenic freezer. Since oxygen boils at a higher temperature than LN_2 (-183^{o} C), the LN_2 can actually condense oxygen out of the air. The liquefied oxygen can be absorbed into the LN_2 or condensed on a poorly insulated container. This oxygen-enriched environment creates a serious fire hazard. Therefore, prolonged storage of LN_2 must be minimized, and oxidizable materials must be kept away form cryogenic storage containers.

When proper handling procedures and PPE are used, contact with LN_2 is rare. In the unlikely event of contact with LN_2, obtain medical assistance through OHS in Building 426 immediately.

Any comments or questions regarding the safe use and handling of LN_2, or any other cryogenic liquid, should be directed to EHS at x1451.